

Please add Claims 49-51 as follows:

- Sub 13
49. (New) A horizontal circuit comprising:
- an input terminal for inputting digital video data;
 - a sequencing circuit for sequencing the digital video data inputted into said input terminal;
 - a horizontal scanning circuit for sampling the digital video data in the sequenced order;
 - a latch circuit for latching the sequenced digital video data synchronously with output from the horizontal scanning circuit;
 - a D/A converter for converting the digital video data output from the latch circuit into analog signals;
 - a transfer switch selection circuit for selecting at least one of signal transfer switches to output the analog signal in the same sequenced order of the digital video data.
- Ref. 13

50. (New) The horizontal circuit according to claim 49, wherein said horizontal scanning circuit has a shift register.

51. (New) The horizontal circuit according to claim 49, wherein said signal transfer switch has a CMOS transistor.--

REMARKS

Claims 1, 2, 4, 5, 7-19, 21, 22, 24-38 and 49-51 are now presented for examination. Claims 1, 18 and 49 are the only independent claims. Claims 1, 18 and 38

have been amended to define still more clearly what Applicants regard as their invention. Claims 39-48 have been cancelled without prejudice. Claims 49-51 have been added to provide Applicants with a more complete scope of protection.

Claims 1, 2, 4, 5, 7-12, 15, 16, 18, 19, 21, 22, 24-29, 32, 33, 35 and 38-47 were rejected under 35 U.S.C. § 103 as obvious from Lewis in view of Yamaguchi and Shinya. Claims 13, 14, 17, 30, 31, 34, 36, 37 and 48 were rejected under 35 U.S.C. § 103 as obvious from Lewis in view of Yamaguchi and Shinya and further in view of Misawa. Cancellation of Claims 39-48 renders these rejections moot.

Applicants respectfully traverse the rejections, and submit that the independent Claims 1, 18 and 49, together with the remaining claims dependent thereon, are patently distinct from the cited prior art for at least the following reasons.

Each of the independent claims recite, inter alia, a selection circuit for selecting at least one of signal transfer switches to output analog signals in the same sequenced order as the sequenced order of the digital video data. By virtue of the recited structure, the number of parts for the external driving circuit for a liquid crystal apparatus can be reduced. In this way, just as in popular analog input liquid crystal devices, the digital image signal can be inputted to drive directly through the D/A converter to the liquid crystal elements, reducing the load on the image signal lines. Further, the load for each D/A converter can be reduced, so as increase the period for writing into the liquid crystal pixel, allowing the driving frequency to be reduced. As a result of these advantageous effects, the total power consumption of the liquid crystal apparatus is reduced, and due to this reduction, increased resolution can be more readily achieved, allowing for a high quality image to be provided with a low amount of noise.

Lewis shows a display driver architecture using D/A converters.

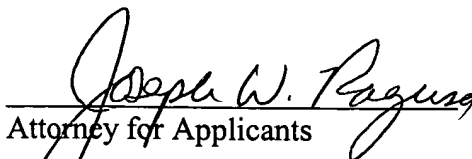
Yamaguchi is relied upon as showing inverting analog signal polarity. Shinya is relied upon as showing the buffering of the analog signal. However, Applicants have found nothing in any of these cited references that teaches or suggests the advantageous feature of the independent claims discussed above.

The other claims in this application are each dependent from one or another of the independent claims discussed above and are therefore believed patentable for the same reasons. Since each dependent claim is also deemed to define an additional aspect of the invention, however, the individual consideration, or reconsideration, as the case may be, of the patentability of each on its own merits is respectfully requested.

In view of the foregoing remarks, Applicants respectfully request favorable reconsideration.

Applicants' undersigned attorney may be reached in our New York office by telephone at (212) 218-2100. All correspondence should continue to be directed to our below listed address.

Respectfully submitted,


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VERSION WITH MARKINGS TO SHOW CHANGES MADE TO CLAIMS

1. (Four Times Amended) A matrix substrate having plural switching elements provided in matrix corresponding to intersecting points of scanning lines and signal lines, plural picture element electrodes connected to the switching elements, and horizontal circuits and vertical circuits for inputting the signals to the switching elements, the matrix substrate comprising:

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an input terminal for inputting digital video data;

a circuit for sequencing the digital video data inputted into said input terminal;

a horizontal scanning circuit for sampling [a picture data based on digital picture signals] the digital video data in the sequenced order;

a latch circuit for memorizing the data synchronously with output from the horizontal scanning circuit;

a D/A converter for converting an output from the latch circuit into analog signals;

plural signal transfer switches provided between the D/A converter and the signal lines;

a selection circuit for selecting at least one of the signal transfer switches to output analog signals in the same sequenced order as the sequenced order of the digital video data;

circuitry which inputs signal-polarity inverting signals together with the picture data, and which inverts the polarity of the analog signal from the D/A converter; and

a buffer disposed between said D/A converter and said selection circuit,

which stores the analog signal of inverted polarity from the D/A converter,

wherein a number M of said D/A converters is less than a number N of said switching elements arranged in a horizontal direction, and analog signals are sequentially inputted from particular ones of said M D/A converters to N/M plural switching elements arranged in a horizontal direction.

18. (Four Times Amended) A liquid crystal device comprising a matrix substrate having plural switching elements provided in matrix corresponding to intersecting points of scanning lines and signal lines, plural picture element electrodes connected to the switching elements, and horizontal circuits and vertical circuits for inputting the signals to the switching elements; a counter substrate opposing to the matrix substrate; and a liquid crystal material placed between the matrix substrate and the counter substrate, the matrix substrate comprising:

an input terminal for inputting digital video data;

a circuit for sequencing the digital video data inputted into said input terminal;

a horizontal scanning circuit for sampling [a picture data based on digital picture signals] the digital video data in the sequenced order;

a latch circuit for memorizing the data synchronously with output from the horizontal scanning circuit;

a D/A converter for converting the output from the latch circuit into analog signals;

plural signal transfer switches provided between D/A converter and the signal lines;

a buffer disposed between said D/A converter and said plural signal transfer switches, which stores the analog signal of inverted polarity from the D/A converter;

a selection circuit for selecting at least one of the signal transfer switches to output analog signals in the same sequenced order as the sequenced order of the digital video data; and

means for inputting signal-polarity inverting signals together with the picture data, and for inverting the polarity of the analog output of the D/A converter,

wherein a number M of said D/A converters is less than a number N of said switching elements arranged in a horizontal direction, and analog signals are sequentially inputted from particular ones of said M D/A converters to N/M plural switching elements arranged in a horizontal direction.

38. (Three Times Amended) [A] The matrix substrate according to Claim 1, further comprising: [having plural switching elements provided in matrix corresponding to intersecting points of scanning lines and signal lines, plural picture element electrodes connected to the switching elements, a horizontal circuit for inputting the signals to the switching elements, and a vertical circuit for driving said scanning lines, the matrix substrate comprising:

a horizontal scanning circuit for sampling a picture data based on digital picture signals;

a latch circuit for memorizing the data synchronously with output from the horizontal scanning circuit;

a D/A converter for converting the output from the latch circuit into analog signals;]

a buffer connected to an output of the D/A converter, which stores the

analog signal of inverted polarity from the D/A converter[; and

polarity inversion means for inputting, together with the picture data, a signal polarity inversion signal and for inverting a polarity of the analog output of said D/A converter according to the signal polarity inversion signal,

wherein a number M of said D/A converters is less than a number N of said switching elements arranged in a horizontal direction, and analog signals are sequentially inputted from particular ones of said M D/A converters to N/M plural switching elements arranged in a horizontal direction].

Claims 39-48 (Cancelled).